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Editorial Comment

IT'S STILL WITH US! The time has not yet arrived when we can sit back with an air of complacency, certainly not with one of satisfaction; and gloat over our conquests along the tuberculosis front. A pride in what has been accomplished may be indulged in—yes, that is true; but while tuberculosis still remains the "Captain of the Men of Death" in the age group 20 to 40, while over a half of all the deaths in our young women from 15 to 25 is caused by it; a certain humility must be observed, and the incentive to further efforts entertained. A very gratifying drop in the mortality rate has been noted during the last two or three decades; but there is a well-grounded and oft expressed fear that if our efforts do not continue unrelenting, a rise in this rate may come. In fact, just this has been observed in some sections recently.

Another very significant observation is that the death rate per tuberculous patient is not showing any appreciable fall—certainly not one in proportion to the falling general mortality rate in this disease. This would seem to indicate that the campaigns of health education among the laity, the vast improvements in matters of health hygiene, etc., have well fulfilled their mission; but that the physician himself has been lax, delinquent in the tuberculosis fight.

To accuse the medical profession of such laxity, in dealing with man's greatest scourge, is indeed a severe indictment—but it appears to be, alas! a true one. The onus falls heavily upon the doctor in general practice. It is he, who in most instances, sees the patient first; and it is up to him to make or suspect the diagnosis, to institute the proper treatment, or to refer the patient to a specialist or a sanatorium where this may be done. It is a well recognized fact today that the general practitioner is the key stone, the pivotal point of the whole tuberculosis structure. It is essential in our future campaign, therefore, that he be made tuberculosis-minded, be grounded in the fundamentals of case finding and treatment. The American College of Chest Physicians is endeavoring to accomplish this; by proper under-graduate instruction in the medical schools; by tuberculosis organization within organized medicine and by the education of the doctor himself through his scientific meetings, and his journal, DISEASES OF THE CHEST. It is comforting to know that whoever reads these lines—unless he be the casual flipper and scanner of magazine pages—is already enlisted in the great crusade.

C. H. H.

COOPERATION OF THE GENERAL PRACTITIONER WITH TUBERCULOSIS AGENCIES

The cooperation of the general practitioner is twofold: First, through his medical organizations; second, as an individual.

I. In accordance with the Pennsylvania Plan, the general practitioner, through the Tuberculosis Committees of his county medical society and state medical society, endeavors to help the county Tuberculosis Committee in its educational field by promotion of tuberculosis papers in medical society and other programs and cooperates with his county and state public health officials by keeping them informed on conditions in the county and state tuberculosis sanatoriums and clinics, as his tuberculosis committees see them.

The general practitioner should acquaint himself with the aims and policies of the leaders in tuberculosis in his organizations, who have given special study to the various ramifications of the tuberculosis problem, so that he can loyally support his own organizations' program. Hostile reaction on the part of an individual, contrary to the expressed policy of his own organization can, and has in the past, disrupted the tuberculosis fight.

II. As an individual, the general practitioner should:

1. Promote and cooperate with tuberculosis surveys in all groups where the tuberculosis incidence of infection is high.

2. Seek the early case with sputum tests and x-rays upon the first suspicion that there is a possibility of tuberculous infection through either symptoms or tuberculous contacts.

3. Cooperate with the local tuberculosis specialist or clinic, realizing that the cure of tuberculosis is in a highly specialized field today.

4. Report every diagnosed case of tuberculosis and tuberculosis death fearlessly and justly, for the sake of present public health, and for that of the generations to come.

5. Cooperate with the county component of the National Tuberculosis Association by: first, education of that part of the public with which he comes in contact as to the responsibilities, duties, and limitations of the National Tuberculosis Association; second, assisting with the sale of Christmas seals—Every Doctor's office a sales booth!

Selling seals gives an opportunity for education of the public. I tried it as an experiment in my private office during the last eight days of the recent seal campaign. I am convinced that the $60.00 collected was less important than the opportunity afforded for education of my part of the public, in the importance, work, and ideals of the National Tuberculosis Association.

The ideals of the National Tuberculosis Association can never be reached without the cooperation of the general practitioner, organized, and as an individual. If those ideals are not reached pretty soon we are going to have Political Medicine, so I call on every general practitioner to lend an informed and energetic and cooperative hand in the Tuberculosis Fight.

F. W. B.

REALLY EARLY DIAGNOSIS

A great deal is said and written, and rightly so, about the tremendous importance of early diagnosis in tuberculosis. At this very writing, the National Tuberculosis Association is launching its early diagnosis campaign—and a most laudible campaign it is. Up to the present time the early diagnosis of tuberculosis has been more the expression of an aim, an objective, rather than an accomplished fact. It is generally considered and conceded that the diagnosis of pulmonary tuberculosis is made in the moderately to far advanced stages in the big majority of instances. Reliable figures and statistics from the sanatoria over the country indicate that around 80 per cent of all patients on admission have passed beyond the early, or minimal stage.

There has come the sad realization that the advent of the classical symptoms, such as cough, fatigue, fever, loss of weight, etc., does not indicate the beginning of the mischief in the lungs. More often than not, with the appearance of these symptoms, the disease has marched apace. To discover that an early diagnosis is only infrequently made when we depend upon hearing rales in the chest; has been something of a disillusionment. When the diagnosis is deferred until tubercle bacilli are found in the sputum, it rarely is that of an

early process; but usually of an advanced affair and with open cavities in the lungs. One striking symptom, however, may occur and literally propel the patient into seeking medical advice at a time when the lesion is an early one. This symptom is hemoptysis. Unfortunately, hemoptysis is not confined to the early case; but the important fact is that it may be—and often is.

The time to be assured of making the diagnosis in tuberculosis early, is in the pre-symptom stage; and when there are no, or very slight, abnormal physical signs and no cough with sputum. The medical profession has for a long time, and with a burning intensity, desired to discover this disease in the incipient stages—the time when it is most curable. Now it has a way to do just this and to emerge from the shadow of defeatism which the advanced and hopeless case created.

By means of periodic health examinations, examination of all contact cases (those individuals exposed to a known case of open tuberculosis) and case-findings surveys in large school and industrial groups—the early diagnosis can, and is being made. In the examination, the tuberculin skin test and the x-ray are of paramount importance. In large groups, and for economic reasons, the tuberculin test is used to screen out those who require no further examination; and to indicate those who do. Every positive reactor to the tuberculin test should be x-rayed; and this x-ray examination should be repeated periodically down through the years, as indicated in the individual case. An individual with a negative reaction to the tuberculin test, when properly performed and with proper materials, is free, with very few exceptions, of any tuberculous infection. Today, we see tuberculosis rather than hear it, and so to make an early diagnosis of tuberculosis it must be seen on a *good* x-ray film and *before* the individual develops symptoms or abnormal physical signs.

C. H. H.

THE SEMINAR OF ASHVILLE The third annual tuberculosis Seminar of Ashville, North Carolina, will be conducted by the Buncombe County Medical Society, July 10 to July 16th, 1939. All sessions will be held in the Medical Library of the Arcade Building. The program is a very strong one which will cover the subject of tuberculosis in all of its phases by able workers in this field. Some of the most important subjects will be *History; Symptoms and Examinations of the Patient; The Minute Anatomy of the Lung, and the Development of the Tubercle; Juvenile Tuberculosis and its Prevention; The Selection of Patients for Collapse Therapy* and many others. The fundamental feature of the course will be the clinical conferences, conducted by several outstanding physicians, with patients in their offices. Every physician who can should attend this seminar. As one of the objectives of the American College of Chest Physicians is to increase knowledge of tuberculosis in the profession, we urge all of our fellows to encourage their medical friends to attend this seminar and others when available.

C. M. H.

WHY? *Why* is the death rate for girls nearly twice that of boys in the age group 15-19? *Why* is the death rate for women 44 per cent higher than men in the age group 20 to 24? *Why* have these variations become greater in recent years? *Why* don't we know whether the death rate is higher or lower among the privileged pupil class or among those who are at work or not in school? *Why* do we have intensive health activities for the infant, the pre-school child, the elementary school child, mothers, men in industry and not a health program for the millions of boys and girls, young men and women, who must necessarily make their physiological, mental, moral, economic and social adjustments during this critical age period. *Why* has the death rate declined the least in this age group—the group which must "carry on" for the entire country?

Until these questions are answered we should not speak lightly of the eradication of tuberculosis. We can justly point with pride at the decline in the death rate from tuberculosis in the *all age group*. We can take little pride, however, in the slow decline of the death rate in the "critical" age group, 15-24.

C. M. H.

Pregnancy and Tuberculosis

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IN THE Social Research Series of the National Tuberculosis Association, a report is given of the investigation of the problem of tuberculosis in young women and the author, Edna E. Nicholson, states that there is a distinct relationship between pregnancy and the onset of tuberculosis.

A review of the literature of the subject for the past thirty years, covering the writings of medical and lay observers, both general practitioners and specialists, shows that, even after all these years, there is still a wide divergence of opinion seemingly amply supported by statistics of the observers as to the proper course of procedure when pregnancy and tuberculosis both are present. Some eminent men lean toward an active attitude, favoring interference by abortion in all cases of tuberculosis of the lungs, regardless of the type of disease, while others, equally eminent, feel that the risk of pregnancy for a tuberculous woman is no greater, if properly treated, than for the non-tuberculous pregnant patient.

There is no doubt that the conduct of pregnant tuberculosis cases, based upon the extreme views expressed by the latter group, has been responsible for a lamentable sacrifice of human life, although with the progress of collapse therapy and early diagnosis the pessimism has not been as fully warranted as previously, and much of the harm that might have befallen these patients has been averted.

The age of the patient, the stage of the disease and the type of the lesion also have a distinct bearing on the prognosis of the case. Unfortunately, it is not clear just what we mean by the term "stage of the disease" and there is no clear definition of the "type of the lesion," leaving room for considerable leeway in interpretation. The treatment would be quite different in a patient with a chronic fibroid or cavitation type of disease, with only a short expectancy of life, than it would be in a young woman in early pregnancy with a very active infiltrating and exudating lesion.

The avoidance of pregnancy is the most important primary consideration for patient and physician. No woman who has active tuberculosis should consider pregnancy for at least two years after complete arrest of her tuberculosis, or even longer if the treatment required to heal the lesion was difficult, or if there is even the slightest doubt in the mind of her physician. The diagnosis of arrest must be based on a very careful study of the entire progress of the case and not be arrived at casually. Also, every available diagnostic aid must be used, resolving any doubt against pregnancy. Many tuberculous patients appear to improve throughout pregnancy, only to show a decided tendency toward aggravation of a mild lesion or activation of a dormant tuberculosis the first few months after delivery. This type of case is especially hard to prognosticate and should be sufficient reason alone for forbidding pregnancy.

If pregnancy has taken place in a tuberculous woman, there are two courses that can be followed, requiring the closest study and keenest judgment for a decision as to the proper course treatment must pursue. One is to interrupt the pregnancy, then devote all and every modern method to cure her. When the cure of her tuberculosis is complete then, and then only, let her bear children. The other is to immediately place the patient in a tuberculosis sanatorium for observation, from six weeks to three months. (It is better to interfere too soon than too late). If improvement is satisfactory, the lesion is found to be minimal, and the sedimentation test satisfactory, the case may be allowed to go on, using collapse therapy and all other means indicated to control the tuberculosis. If the tuberculous condition grows worse, interruption of pregnancy is indicated immediately, preferably before the end of the second month, followed by active tuberculosis therapy.

The secondary question, then, to decide in the presence of tuberculosis and pregnancy can be stated thus: Is therapeutic abortion

justified in tuberculosis? After reading the voluminous articles and reports of innumerable investigators, the widely divergent views of the writers seem irreconcilable, but on careful study the general principles that apply become very simple—more simple than trying to reduce them to print.

In some cases, particularly advanced active cases, abortion acts as a stimulus to the chest lesion, and non-interference is preferable, if it is felt after careful observation that abortion will mean death for both mother and child, while allowing progress of the pregnancy may mean death of the mother, thus sacrificing everything for a live child. Early induction of labor and forceps delivery may be indicated. With collapse therapy, even these apparently hopeless cases can often be carried through a normal pregnancy and delivery, treatment being continued after delivery. By doing a phrenectomy or phrenic crushing and using greater than usual pressure by pneumothorax, and, in selected cases, holding the diaphgram by use of pneumoperitoneum after delivery the prognosis is materially improved. The efficacy of collapse therapy may limit the indications for therapeutic abortion in this type of case.

It may be stated as a general rule, however, that in most cases of tuberculosis, it is best to remove the pregnancy and let the woman have all her facilities for conquering the tuberculosis. Then, after the danger from tuberculosis is past, let her produce the offspring she desires. In other cases, as stated above, a rather large group, becoming larger as a result of early diagnosis and collapse therapy, and selected by careful observation, with the patient constantly under good sanatorium treatment, may preserve the fetus, and therapeutic abortion may be withheld. Artificial pneumothorax often brings an active lesion under control and pregnancy may proceed without complication. Moreover, if the lesion is well collapsed, it is not usually necessary to separate the mother and infant after delivery to prevent infection by tuberculosis of the infant from the mother.

The question of pregnancy and tuberculosis needs the closest cooperation and study, not only by those who practice the treatment of tuberculosis, but by obstetricians and internists, to the end that the lives of the mothers may be preserved, their health conserved, and the lives of a large number of infants saved.

With a better and more intelligent understanding of the problem on the part of the tuberculosis specialist and the obstetrician, the pregnant tuberculous patient may emerge from her pregnancy experience (once looked upon as a most dangerous and unjustifiable happening) almost, if not quite as safely as the non-tuberculous woman.

In none of these patients should lactation be permitted, as it increases the hazard for the mother by using her recuperative and healing powers for the production of milk. Where the case is open, there is great danger to the infant who is apt to acquire a tuberculous infection from the mother.

In the decision to interfere by abortion the social aspect must also be considered, because in many instances a woman would be unable to take care of her child and her home surroundings would not be proper for the welfare of the baby, which makes it necessary to terminate. The problem here, like the entire problem of tuberculosis, is not only medical but social. The religious aspect of the problem is purposely omitted from this discussion, but must be born in mind when outlining treatment for any given case.

Briefly, then, the principles to be followed can be stated about so:

First, no one has shown definitely that pregnancy is good for the health of a tuberculous woman in any stage or type of tuberculosis. A neutral effect of pregnancy on a tuberculous lesion is not asked—the risks are too great.

Second, most investigators, easily 75 per cent, believe that pregnancy aggravates tuberculosis, while no one has proved that abortion, properly performed, aggravates an early, quiescent or arrested lesion, if proper tuberculous therapy is followed afterwards.

Third, every one admits that pregnancy places a severe strain on a tuberculous woman's resources and strength, and that labor is fraught with immediate and remote perils.

Fourth, the fate of the patient does not depend on the fact that she is pregnant, but rather upon the character of the chest lesion and upon the care she receives during pregnancy and puerperium.

Fifth, after labor or abortion, treatment for

the chest condition should be carried on vigorously. Treatment must be continued over sufficient time to guarantee arrest and should not be discontinued too early—in any event—only after very careful observation and study by an experienced phthisiotherapist. Subsequent pregnancies should be allowed only after careful study of the case has shown the chest lesion completely arrested or under complete control.

Sixth, therapeutic abortion should be done as early as possible when decided upon, but after the fourth month of gestation the effect of intervention is comparable to a full term delivery. With proper collateral care in cases that have not shown an acute flare up earlier, the risk can be safely assumed, the physician being ready to interfere as soon as labor starts, so as to terminate it rapidly, as by forceps, sparing the patient the stress of inhalation anesthetics.

In closing, I should like to briefly discuss a new technique for therapeutic abortion that has a distinct value in pregnant tuberculous patients. Mayer, Harris, and Wimpfheimer recently published their experience with x-ray as the means of inducing abortion and this seems an ideal method to use in tuberculous cases. After a consultation between the gynecologist, the radiologist and the pthisiologist, in which the question of intervention and method are decided upon, the patient is informed of the possibility of a permanent amenorrhea, a condition not wholly undesirable in a tuberculous patient. After treatment, the patient usually aborts spontaneously, customarily in 19 to 35 days, with only slight bleeding. Convalescense is quite uniformly uneventful. On discharge, the patients are given contraceptive instructions, although the treatment can be repeated, if pregnancy ensues. If menopausal symptoms occur, they are usually mild and can be controlled by ovarian extract.

Extrapleural Pneumothorax

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OPERATIVE procedures in collapse therapy for cavernous pulmonary tuberculosis have received new impetus during the last decade. So much progress has been made in this period that it is doubtful whether our statistics in the survey of major collapse measures are of much value, if those results were carried out prior to the year 1930.

There have been too many surgical variations from too many sources to attempt to give any chronological history of selective collapse or, as some of the German workers have suggested "aimed collapse". New experience has shown that as much normal or nearly normally functioning lung area should be preserved, as is possible.

With the definite increase in the treatment of early cases with artificial pneumothorax both in and out of sanatoria, adequate collapse has been defeated by dense adhesions between the apex and the chest wall. Temporary phrenic interruption and intrapleural pneumolysis were added to make the collapse more satisfactory, yet many cavities could not be compressed by the use of these additional measures. For such a group, in certain selected cases, extrapleural pneumothorax has been suggested.

This operation was first done for severe pulmonary hemorrhage by Tuffier, in 1893, in which no filling was attempted following the pneumolysis. Somewhat later, in 1910, he attempted to hold the apicolysis space with omental fat removed from another patient, and in 1911 inserted a fresh lipoma. Others used fat from the abdomen or gluteal region and Davies carried a pedicled section of the female breast to fill the extrapleural hole. Most of these were absorbed or the volume so reduced that little pressure was exerted on the desired area. Other substances such as muscle flaps, rubber dam, pieces of rib, fine meshed silver wire, and in 1913 wax, were used to maintain the apicolysis. Of all of these materials, the use of plomb became the most widely employed, yet the insertion of a for-

eign body in living tissue is always unsurgical and often the substance proved unsatisfactory, being extruded through the skin incision or coughed up through the bronchus. In other words, while a good extrapleural space was secured, few of those substances could be counted on to maintain the cavity and exert pressure over the area desired. It is noteworthy that in one of Tuffier's last cases he attempted to insert air, but it proved unsatisfactory because of leakage. Many others suffered from similar failure when air or nitrogen was used so that the method fell into disrepute until 1934 when it was taken up by Graf of Germany.

It would seem that Nissen and Michelson, and some other workers attempted pneumolysis over a limited area aimed over the cavity or major lesion without taking measures to maintain the collapse. Graf proceded to carry out the pneumolysis in the layer between the endothoracic fascia and the parietal pleura in the loose areolar tissue between these two. His dissection was extended well over the apex and mesially along the mediastinum to the root of the lung. Then, originally, a catheter was left in place for drainage as well as for inflation with air. Many of the early cases became infected and the cavity was of necessity filled with oil.

Operative Technique

Our own approach presents nothing original. A curved incision is begun at the level of the first rib midway between the mesial border of the scapula and the spinous processes and extended to below and slightly lateral to the angle of the scapula. The muscles are divided. After the plane of the rib cage is reached, a very careful dissection of a U-shaped pedicled flap is started. This includes the deep fascia and the insertion of the scalenus posticus muscle and upon the neatness and integrity of preserving the flap intact depends the success of the essential air-tight closure. Only 4 cm. of either the 3rd or 4th rib is removed subperiosteally, rather close to the angle and the transverse process of the vertebra using great care not to wound the pleura. This is generally greatly thickened because of long standing disease in or about the apex and often is quite adherent to the under surface of the periosteum of the ribs.

A line of cleavage is secured by starting either with the finger or by blunt dissection a separation of the parietal pleura from the periosteum and intercostal structures of the 2nd rib. This usually strips easier if extended laterally and anteriorly, then followed by the area along the gutter and anterior surface of the vertebral body. Lastly, the apex is freed and extended toward the mediastinum to the root of the lung. When tough adhesions are encountered great care must be observed in the division, since there is the ever present danger of tearing the pleura, with the possible rupture into a cavity, after which a bronchial fistula and infection would follow. It has been our custom to treat these adhesions more and more gently and, if at all resistant, to divide them under vision of a Cameron light by section with scissors or scalpel. A small catheter is left leading to the extrapleural space so that after the flap is sutured in place, saline may be injected to maintain the cavity until a short interval of healing has occurred.

Post Operative Course

It is essential not to permit too long an interval to elapse before the saline is withdrawn and air substituted or the space will be lost. Ordinarily, it has been our custom to carry this out at the end of 48 hours. In some, the saline is very slowly absorbed in contrast to fluid injected into the pleura, peritoneum or subcutaneous tissues and may be seen from 3 to 7 days after surgery. We have the impression that the degree of fibrosis in the parietal pleura may be the reason for this delay. Small air fills of 150 to 200 c.c. are required during the early stages and the pressure gradually increased to plus ten or twelve. During the second to fourth week this is done at intervals of twice a week, after which the time of fills may be lengthened.

Complications

The complications of the operation are not frequent. Hemorrhage from injury to one of the intercostal vessels occurs but seldom and can easily be controlled when it does. Late bleeding has not been observed in our cases.

Injury to the parietal pleura and tear into a cavity does occur if the separation is not

attended with the greatest caution. Denk and Domaing state that this happened in 3 of their 31 cases. Alexander mentioned that it occurred in two of his early cases with fatal results. Sauerbruch relates that in one of their 28 pneumolysis patients the mediastinum was torn and the patient succumbed to the pressure from emphysema.

Lastly, must be mentioned the danger of autotuberculinization from manipulation of a sizable cavity with liberation of toxic products that cause high fever, prostration, and chills. Also the formation of a rather large dead space between the chest wall and parietal pleura invites infection from latent foci of infection. Drainage must be instituted if this occurs and a thoracoplasty done at a later date.

Indications

We believe extrapleural pneumothorax is indicated in those patients in whom intrapleural pneumothorax has yielded inadequate collapse because of dense adhesions and in whom thoracoplasty is deemed unsuitable. It has been found most applicable in those whose disease is relatively active and instable and whose general condition would not stand the major operation because of shock and hemorrhage. This measure may also be used especially in cases of early cavity with too much activity in the contralateral lung, or elected because of advanced age, other impairment such as emphysema, myocardial weakness or renal tuberculosis.

It would seem to be contra-indicated in those patients with large fibrotic stiff-walled cavities where anything less than permanent collapse would tend to displace the cavernous area without approximating the dense wall.

Conclusion

Finally, there is not the irrevocable nature to the procedure that there is to plombage or thoracoplasty and the lung area can be recovered when healing takes place. We are quite free to admit that the length of time needed for cavity closure cannot be estimated and sufficient time has not elapsed since the procedure was revived and perfected in its present form to evaluate the results on a large group. It would seem to hold great promise in certain selected cases.

Summary

1. Extrapleural pneumothorax is discussed.
2. The operative technique and after care is related.
3. This procedure would seem to hold great promise for dealing with relatively recent cavernous pulmonary tuberculosis where intrapleural pneumothorax has yielded inadequate collapse.

Discussion

Dr. Slyfield: How long is it necessary to continue pneumothorax in cases of extrapleural pneumothorax?

Sufficient time has not elapsed since the procedure has been done to obtain an average length of time needed to keep up pneumothorax. A great many variables of necessity would have to be taken into account and enough cases in large groups have not been operated to strike any mean in the different types and the time required. Graff and Schmidt did their first cases two years ago. They found that if the extrapleural space became smaller and it appeared as if an obliterative pleuritis encroached the area and they were about to lose the extrapleural pocket that small fills of oil should be started and continued.

Dr. Everingham: We quite agree with Dr. Slyfield that extrapleural pneumothorax is in the experimental stage, but physiologically seems to have exceeding great promise in the operative procedures of collapse therapy.

Dr. Dolley: There seems every reason to believe that extrapleural apicolysis or pneumonolysis for extrapleural pneumothorax carried out on patients, carefully and intelligently chosen, will prove to be an additionally successful weapon of offense against well established pulmonary tuberculosis. While the supremacy of thoracoplasty in a very considerable and well-defined proportion of tuberculous persons is in nowise threatened, yet many in the past subjected to thoracoplasty will become arrested by this recent therapeutic adjunct which, when uncomplicated, produces neither operative shock nor physical deformity.

The indications, based upon Schmidt's series and our own of approximately 70, are di-

vided rather sharply into two classifications: absolute and relative.

The absolute indication exists in unilateral cases in good condition where intrapleural pneumothorax is definitely the procedure of choice, but is precluded by intrapleural adhesions. That is to say, when the intrapleural space is not available one may establish an extrapleural space and proceed as originally planned. In this group, the apical involvement is comparatively recent, cavities are soft-walled, and there is a smoldering tendency to advance and recede during the early months of clinical observation. Temporary diaphragmatic paralysis has been tried or considered as of no therapeutic advantage. This type of case uniformly responds to extrapleural air compression with startling success.

The relative indications are by no means satisfactorily clear-cut, nor do the results compare favorably with those where the indications are absolute. When the greater part of a lung is involved with marked fibrosis, thick-walled cavities and bronchial distortion, extrapleural pneumothorax would be no more successful than an intrapleural pneumothorax has proved to be under such conditions. Thoracoplasty is the procedure of choice. Yet there is a large group where long established cavitation exists in the upper lobe with a variable amount of fibrous processes extending in every direction to pulmonary peripheral structures. The lung fields appear uninvolved below the 6th or 7th rib posteriorly. In this group not only the indications, but the end results are relative as compared with the first group limited to the most favorable conditions.

While the prognosis by extrapleural pneumothorax is not good yet, usually the general condition of the patients is patently improved so that if finally a thoracoplasty becomes necessary it is a definitely less hazardous undertaking. Occasionally, a person at the time unfit for thoracoplastic collapse can be sufficiently improved by temporary extrapleural pneumothorax to safely permit it later, provided cavity obliteration has not occurred. It seems not unlikely, however, that the parietal pleura and the lung beneath may, following extrapleural pneumothorax, become so thickened and resistant that even though an extensive thoracoplastic collapse of this region be produced, complete approximation of the cavity walls may not be accomplished. We feel, therefore, that it will not be safe for a doctor to tell his patient that in case extrapleural pneumothorax does not prove successful thoracoplasty can always be done to accomplish the desired result. Fibrosis of the soft tissues overlying the cavity subsequent to the extrapleural pneumothorax may prevent cavity closure that might have taken place had the thoracoplasty been done initially. If, however, the physical condition precludes thoracoplasty and the collapse of the tuberculous tissue is definitely necessary, the possibility of this complication need not be the deciding factor against the establishment of an extrapleural pneumothorax space.

Bilateral involvement precluding thoracoplasty may be amenable without undue risk to extrapleural pneumothorax. Either one or both sides may become arrested by this procedure.

The technique necessary to maintain this extrapleural space by the introduction of air differs considerably from that followed in intrapleural pneumothorax:

(1) a longer needle is necessary;
(2) a manometer graduated to 50 to 60 cm. of water, instead of the usual lower scale;
(3) insertion of the needle either in the first interspace anteriorly or just lateral to the upper half of the operative incision posteriorly.

It is to be noted that due to the overlying parietal pleura the swing recorded on the manometer is less; the quantity of air required to maintain collapse, smaller. The actual pressure obtained is considerably higher at first, ranging from plus 35 to plus 45, but within one to ten minutes it usually falls to plus 10 or plus 15 where it remains fairly steady. Frequent check up by fluoroscopic examination is, of course, necessary.

As a rule, we feel it advisable to introduce air approximately twenty-four hours postoperatively, since if longer delay occurs, it may be very difficult to find the space and the edema in the lung may prevent the collapse which is so essential to success. Great care should be taken to avoid injury with the needle to the underlying parietal pleura and

lung. Should this occur extrapleural infection might follow. It is important, therefore, that one should as carefully locate this space and avoid trauma to the deeper tissues, as in the initial stages of the establishment of an intrapleural space. Usually 50 to 100 c.c. of air are injected at the first refill. During the first week or ten days it is often necessary to inject air daily in order to collapse adequately the lung that has been released extrapleurally. We are convinced that the ultimate success of this operation depends largely upon the constancy of the extrapleural pressure during the first few days following operation. After the space is once satisfactorily developed, weekly refills are as a rule enough. One is guided, as in intrapleural pneumothorax, by the rapidity of air absorption.

From the 47 extrapleural pneumonolyses which Doctors Jones, Skillen and I have developed at Olive View Sanatorium to June first, we have chosen the first 40. These have been constantly under the care of Doctor Skillen and her associates trained in this procedure. The course and present condition of these patients is, therefore, accurately established to date.

The complications that have occurred in the combined absolute and relative operative indications are:

1. Three have lost their extrapleural spaces. In one of these the initial refill was inadvertently postponed until the re-expanded lung with its overlying pleura had become adherent to the chest wall. In the remaining two, the cause for re-expansion could be attributed to either one of two factors: (a) gradually increasing circumferential adherence of the parietal pleura advancing up the chest wall, or (b) that with the stripping extrafascial, rather than beneath the endothoracic fascia, the tendency for adherence which is much more marked outside the endothoracic fascia than deep to it produced finally complete lung re-expansion.

2. One, during a refill, suffered a cerebral air embolus which was absorbed within a few hours without disaster. Subsequent air introductions have been uneventful.

3. Eight developed clear or sanguineous fluid. This fluid was controlled by aspiration immediately preceding the various air injections until complete re-absorption had occurred.

4. Four developed pus in the extrapleural space. In three it was tuberculous. In one the purulent fluid was of pyogenic origin. Both Graf and Schmidt emphasize that the extrapleural reaction is much less than when this complication develops during the course of intrapleural pneumothorax. Our experience was in accord with theirs.

In the uncomplicated case, temperature usually rises to 101 or 102 for the first two or three days postoperatively and within five days approximates normal. If fever persists an extrapleural empyema is likely. If by x-ray a fluid level is evident and by aspiration is found to be infected, the cavity is thoroughly irrigated with salt solution and, following the recommendation of Schmidt, 10 c.c. of 2½ per cent solution of gomenol is instilled. These irrigations and instillations are repeated weekly. In both tuberculous and pyogenic extrapleural empyemata, not only is toxic reaction much less than when a like infection develops between the pleural leaves, but also these infections seem to be much more amenable to gomenol treatment which serves both to aid in the destruction of the bacteria and maintain the extrapleural space.

Of the first 40 cases under treatment by extrapleural pneumothorax at Olive View the duration of tuberculous disease was as follows: 2 had known of their disease for less than six months; 5 others for less than a year; 10 others for less than two years; while 23 of the 40 had suffered from pulmonary tuberculosis from two to more than twenty years.

There were 27 with indications but relative, that is, chronic disease with thick-walled cavities and extensive pulmonary fibrosis. Of these, 7 show no evidence of cavitation, and in 6 others complete obliteration is not certain. In 7 of this group, the sputum is negative by concentration.

In 13 instances, however, the indications were absolute; namely, only moderately firm scar tissue, with comparatively soft-walled cavities and little distortion of surrounding structures. With these, intrapleural pneumothorax would probably have been successful had a free pleural space existed. All but one of these so-called absolute cases have complete cavity closure by careful x-ray check.

The thirteenth is questionable. All but one have negative sputum by concentration. The thirteenth has not been checked.

Doctor Everingham has thoroughly described the technical procedures. In early cases the operation may not be particularly difficult. In long established ones, however, with marked fibrosis and thick-walled cavities, the production of an adequate extrapleural space may be by no means easily accomplished. Three things are important:

(1) Identification and persistence along the "optimum plane," that is, the line of cleavage between the parietal pleura and endothoracic fascia, not outside the fascia.

(2) Subfascial separation should extend at least 2 cm. below the lowest level of involved tissue that requires collapse.

(3) The floor of this extrapleural space should be approximately level. Schmidt has called particular attention to the tendency toward early lung re-expansion where the parietal pleura approximates by an acute angle the nearby chest wall.

It is evident from a consideration of the results in cases where the indications for extrapleural pneumothorax were only relative that thoracoplasty still is a necessity in a considerable proportion of tuberculous patients, if arrest of their disease is to be achieved.

The initial results when absolute indications exist have been particularly encouraging. The procedure employing the modern technique is comparatively new. Scarcely more than 300 cases have been reported. The series of 70 to June first that we report roughly parallels in contemporary results those of Graf and Schmidt. It is essential, however, that all of us should keep clearly in mind two facts that our enthusiasm for this therapeutic measure may not develop unwisely:

(1) That definitely favorable indications for the establishment of extrapleural pneumothorax, though reasonably clear-cut, are largely limited to comparatively early pulmonary disease where intrapleural pneumothorax would be the procedure most advantageous—were it possible.

(2) That statistics concerning actual end results, as to the fate of the collapsed lung upon the termination of pneumothorax treatment, are not yet available. Will lung re-expansion occur or will thoracoplasty, long deferred, be necessary?

Incontrovertably, extrapleural pneumothorax is to be preferred to thoracoplasty when it offers to a particular person a reasonable opportunity to arrive at the end of his therapeutic trail along the extrapleural route by acquiring a negative sputum without chest wall collapse and crippling reduction in vital capacity.

Dr. Emil Bogen: The gratifying results which have been recently obtained by the use of extrapleural pneumothorax, and the widespread enthusiasm which this procedure is arousing, cannot be gainsaid. The question arises, why did not the score of workers from Tuffier to Joannides, who had attempted the establishment of extrapleural pneumothorax pockets in the past, persist in their efforts.

The answer given by Graf and Schmidt, the fathers of the present revival of the operation, is simple and convincing. It is based on an anatomical distinction which was not made by the earlier workers. The parietal pleura, according to the newer conception, is covered by a thin layer of loose areolar tissue, traversed by few large vessels or fibrous bands, which underlies the denser connective tissue sheet of the endothoracic fascia. The endothoracic fascia, in turn, is bound to the ribs and intercostal muscles by another layer of areolar tissue, in which are to be found abundant blood vessels and heterogenous connective tissue bands. Previous workers attempting extrafascial separations not only had greater technical difficulty in making the separation without hemorrhage or perforation, but were bothered much more by subcutaneous emphysema and loss of the space than occurs when the separation is made in the optimum plane below the endothoracic fascia.

Although anatomical text books generally pay no attention to this distinction, dissections performed at the Olive View Sanatorium have convinced us of its validity, and lead us to feel that the scrupulous effort of our surgeons to make the separation in this layer

may account in part for the success which they have achieved.

Although none of the cases at Olive View have died, as yet, and so we have no autopsy studies of this material, the performance of a second stage extrapleural separation by Dr. John Jones on one patient in whom a large cavity remained open after the usual procedure gave an opportunity for some interesting observations. In this instance, the second operation was made from below, and the separation continued upwards, forming a second pocket, beneath the upper one. The sheet of tissue separating the two pockets was then excised. This tissue contained, then, on its upper surface, the lining of the extrapleural pocket which had existed for about six weeks; the lower surface consisted of the freshly separated areolar tissue of the subfascial plane.

Section of this tissue showed the freshly torn surface to contain loose fibrous bands running in all directions, with numerous capillaries torn and a small amount of hemorrhage over the surface. The other sides of the tissue, which were thought to have been of the same nature six weeks previously, presented, instead, a dense sheet of parallel connective tissue fibers, the surface of which appeared to be covered with long flat cells resembling the appearance of the normal pleural lining. No tuberculous or inflammatory lesions were seen on the section examined. This finding, which is consistent with that reported by Schmidt, would indicate that the extrapleural space, when once well established, may be considered in many ways to assume the properties of the more familiar intrapleural cavities with which we are so much more familiar.

The Significance of Pulmonary Hemorrhage

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HEMOPTYSIS is an important symptom of pulmonary disease. It may also represent a complication of some previously recognized clinical condition. As a symptom it must be regarded as a danger signal of possible serious underlying pathology. This fact has been emphasized and re-emphasized, but its true significance is being overlooked constantly in medical practice. The cause of pulmonary bleeding may be readily apparent, or the etiology may remain obscure after the most exhaustive study. To minimize its importance because of the absence of objective signs will sooner or later lead to disastrous results.

There are many causes for pulmonary bleeding, but tuberculosis predominantly takes first rank as an etiological factor. It can be conservatively estimated that ninety per cent of all frank hemorrhages from the lower respiratory tract are due to tuberculous infections. Conditions, such as bronchiectasis, neoplasm, suppuration, bronchial membrane ulceration, and passive congestion taken in the aggregate, account for the other ten per cent. The more general use of the bronchoscope and improved roentgenological technique have brought to light an increasing number of non-tuberculous causes of pulmonary bleeding. Today, the clinician who encounters these cases must think not only of tuberculosis, but of the large group of other conditions which may be responsible. One of the most perplexing types of patients is the apparently well individual who presents himself because of the expectoration of blood, and medical examination fails to reveal the cause of the hemoptysis. When the diagnosis is apparent, treatment naturally falls into established channels, but when the source of the bleeding cannot be determined, future handling of the patient becomes more difficult.

The time-worn advice of considering every case of undiagnosed pulmonary bleeding as of tuberculous origin until proved otherwise is still a sound medical procedure. This group of patients should be classified as tuberculosis suspects and treated as such until a de-

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finite diagnosis is established or continued observation fails to reveal the presence of significant pathology. Observation, to be effective, must include repeated examinations of sputum for tubercle bacilli, bronchoscopy and serial roentgenograms of the chest. The tuberculin test, particularly if negative, will help materially in narrowing the field of pathological possibilities. The bronchial tree should be studied after the instillation of an opaque oil when possible.

The following briefly summarized case histories illustrate some non-tuberculous causes of hemoptysis:

Case 1: A male, aged 55 years, whose occupation was a business executive, expectorated several mouthfulls of bright red blood in the morning while shaving. His past medical history was unimportant and he had had no previous respiratory symptoms. The bleeding subsided in a few minutes and, except for a slight cough, he suffered no apparent ill effects. Physical and x-ray examinations of his chest were negative. Bronchoscopic examination two weeks later did not reveal anything of significance. X-rays were made at four-week intervals and continued negative for three months. The first x-ray evidence of a pulmonary condition appeared in the fourth month when a small infiltrating mass was seen extending out from the left hilus. A rapid spread of the infiltrating process into the parenchyma of the lung followed. Five months later he died from a bronchiogenic carcinoma.

Case 2: This was a school girl, 14 years of age, who came home after a strenuous roller skating party and had a rather severe pulmonary hemorrhage. Physical examination revealed some moisture in the left lower lobe. Prior to the hemorrhage, her health had been excellent. Her mother stated, however, that since early childhood she had had a slight cough associated with some expectoration. Her sputum was negative for tubercle bacilli. An x-ray of her chest did not at first reveal anything of significance. She had a negative tuberculin test. Subsequent x-rays, taken after the instillation of lipiodol into the bronchial tree, revealed a small bronchiectatic area at the base of the left lung behind the heart. Presumably this was the source of her bleeding.

Case 3: A housewife, aged 31 years, had been under treatment for pulmonary tuberculosis in 1936 and 1937. The lesion, which was limited to the right apex, healed and she remained well until January, 1939, when she had a frank pulmonary hemorrhage. Physical examination did not reveal any change in the pulmonary lesion and, except for the bleeding, there was no indication of reactivation of her tuberculous process. Bronchoscopic examination showed a small bleeding ulcer in the mucous membrane of the right main bronchus. We are not entirely certain as to whether it was a tuberculous or a benign ulcer. It was cauterized with 20 per cent silver nitrate, and the patient has continued her usual activities without recurrence of hemorrhage.

Case 4: A male, 17 years of age, who was a clerk, had an acute respiratory infection, followed by a dry, hacking cough, which later became productive. He was short of breath and lost weight; was running an afternoon temperature. Three months after the onset of his symptoms he had a frank pulmonary hemorrhage followed by an acute pain in the right chest. His sputum was negative for tubercle bacilli. There was dullness over the lower right chest and an x-ray showed a dense box-shaped shadow involving the inner half of the base of the right lung. Bronchoscopic examination revealed the lower lobe bronchus to be partially occluded, with a papillomatous growth which bled on the slightest manipulation. This was removed and pathologically found to be a benign polypoid formation. The patient made a complete recovery.

Case 5: A housewife, 36 years of age, had cough, expectoration, dyspnea, hemoptysis, afternoon temperature and night sweats over a period of three years. A diagnosis of pulmonary tuberculosis had been made in spite of a negative sputum and she had had several months' sanatorium treatment. Physical examination showed a dull right base, with an absence of breath sounds. The x-ray revealed cloudiness over the lower half of the right lung. On bronchoscopic examination there was found an obstructing mass in the right main bronchus. Pathologically, this was the same as in the preceding case. Its removal through the bronchoscope was followed by

complete recovery.

In tuberculosis, bleeding may occur as an initial symptom, or at any time during the course of the disease. It is perhaps a fortunate circumstance when it occurs early. There is no other symptom of pulmonary disease, with the possible exception of pain, that will drive the patient to seek medical advice sooner. Investigation of other prodromal symptoms of tuberculosis, such as cough, expectoration, fatigue or loss in weight, may be unduly delayed by the patient's willingness to explain them to his own satisfaction on some other basis. A mouthful of blood, however, causes a well-justified fear which usually puts him under medical observation.

It is estimated that from 30 to 50 per cent of the patients with pulmonary tuberculosis expectorate blood in varying quantities at some time during the course of their illness. Fortunately, the percentage of fatalities from exsanguination is low. Less than three per cent of the mortality from pulmonary tuberculosis is due primarily to loss of blood from hemorrhage. The quantity of blood expectorated may range from blood streaks in the sputum to many ounces. The amount of blood expectorated in no way represents the extent of the pathology or the degree of activity of the infection. Bleeding may occur in a quiescent process or even in a lesion which is apparently completely healed. Some patients never have hemoptysis throughout their illness, while others have repeated hemorrhages. The same patient may, at times, have severe and at times slight bleeding. The immediate danger from pulmonary hemorrhage is that of suffocation from the large amount of blood coagulating and obstructing the bronchi or trachea. In these instances death may result quickly. More frequent, however, is the aspiration of infected bloody material to distant parts of the lung. It has been shown that the aspiration of sterile blood into normal lung tissue may set up considerable reaction and this inflammatory process is readily demonstrable on x-ray, but usually subsides without ill effect.

When the blood is mixed with tuberculous material, a bronchiogenic spread of the disease is quite likely to occur. Various theories have been advanced as to the pathogenesis of bleeding from tuberculous foci. Hemorrhage from the lung may arise from either the bronchial or pulmonary circulation. It may be arterial, venous, or capillary in origin. The bleeding point, however, is most frequently located in the pulmonary circulation, and is rarely seen in the bronchial vessels except in rare cases of bronchial mucous membrane ulceration. Bogen, in an excellent article on the pathogenesis of hemoptysis, states, "The condition most frequently noted is an aneurysm developing on a branch of the pulmonary artery lying in the wall of a cavity. The patient's blood vessels in such cavity walls are often thick-walled beyond the normal, and bound down by fibrous bands which may in places produce partial or complete occlusion of the lumen."[1] The resulting interference with the nutrition, rather than any local infection of the vascular tissue itself, may cause the weakening of the pulmonary arterial wall and the formation of an aneurysm. Occasionally, this aneurysm may become lined with a laminated clot undergoing organization similar to that found in healing aortic aneurysms. Such lesions are usually found in the larger branches of the pulmonary arteries, but may develop in the smaller ones, and even in the capillaries. It is often stated that the cause of pulmonary hemorrhage in tuberculosis is the erosion or ulceration of blood vessel walls by a developing tuberculous process.

Since the tubercle bacillus and its products are capable of producing death with subsequent softening and liquifaction of tissues, it might be assumed that this process acting on the blood vessel wall might produce similar softening and consequent rupture of the vessel permitting the escape of blood. The cause of the hemorrhage would then be a direct result of caseation affecting the blood vessels. As a matter of clinical experience, however, we see comparatively few hemorrhages in the exudative and rapidly progressive types. Hemorrhage in the childhood type of infection and in miliary tuberculosis is comparatively rare. Most of the hemorrhages occur in patients with the fibroid type of disease, in which the advance of the pathological process is slow.

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1 Emil Bogen, "The Pathogenesis of Tuberculous Hemoptysis," *American Journal of Clinical Pathology*, Vol. 2, 1931, p. 301.

It is an interesting observation in institutional practice that hemorrhages come in groups. There seems to be some relationship between a rapidly changing barometer and the expectoration of blood. At such times, we nearly always have not one, but several patients who complain of blood spitting. Hemorrhages, however, may occur at any time, irrespective of climatic changes, so that the fact that they seem to come in groups may be purely coincidental. At least, no satisfactory explanation has been offered as to how a changing barometer could be responsible, nor is there any evidence that hemorrhages can be predicted by watching the barometer. This apparent grouping of pulmonary hemorrhages, however, has been observed and reported by a number of writers.

There is little doubt that external factors may precipitate a hemorrhage. We frequently see pulmonary bleeding occur following strenuous physical exertion, or a crushing injury to the thoracic wall, even without fracture of the ribs. Bleeding may be brought on by a severe paroxysm of coughing. These factors are no doubt mechanical in their effect. Anything which tends to put undue strain on an already weakened pulmonary vessel may cause the tissue to give way and permit the escape of blood. Strain may come from intensified respiratory excursion resulting from exercise or increased intrapulmonary pressure during a paroxysm of coughing. A sudden blow on the chest can quite conceivably open up a blood vessel which is already friable, particularly when the normal elasticity of the lung tissue is impaired with adhesions or scar tissue. These possible etiological factors have an important bearing on treatment where pulmonary bleeding is prone to occur.

The influence of exercise or undue physical strain as an aggravating cause of pulmonary bleeding brings up an important medical-legal question. We are seeing an increasing number of patients who claim disability resulting from pulmonary hemorrhage. In Pennsylvania, tuberculosis is not an occupational disease. Compensation, however, can be claimed, if aggravation of tuberculosis resulting from occupation can be proved. Many of these claims are based on disability from pulmonary hemorrhage alleged to have been aggravated by work. Some recent examples illustrate the problem.

Case 6: A man, aged 50 years, had worked as an electrician for an electrical concern for many years. He had an excellent work record and no history of significant past illness. In fact, he had lost but very little work from sickness over a period of years. He reported for work as usual and during the day picked up an unusually heavy electric motor, which he placed on a work bench. Immediately following this exertion he began to cough, and expectorated a considerable quantity of bright red blood. Examination of his chest a few days later revealed a moderately advanced fibroid type of pulmonary tuberculosis. The hemorrhage resulted in a bronchiogenic spread of the disease and he died a few weeks later. The case went to court on the grounds of death due to tuberculosis aggravated by a pulmonary hemorrhage, caused by undue exertion while employed. A verdict was given in favor of the claimant.

Case 7: A man, 35 years of age, was employed as a fireman for a power company. He had worked for a number of years with a good record and no history of significant previous illness. One of his duties was to clean the clinkers from the fire boxes of the boilers. In doing this he used a crow-bar and had to exert considerable force. On the day of the alleged accident, the bar stuck and required a great deal of physical effort to free it. Shortly after this exertion, he had a pulmonary hemorrhage. Examination revealed a small apical lesion of tuberculosis, which appeared to be well fibrosed. He filed suit on the basis of tuberculosis aggravated by the incident requiring unusual physical exertion. He was awarded disability.

Case 8: A man, 40 years of age, was working in a chemical plant, when a nearby fellow-workman dropped a retort containing chlorine on the floor. The fumes caused the patient to have a violent paroxysm of coughing which was almost immediately followed by a frank pulmonary hemorrhage. Subsequent examination revealed the presence of pulmonary tuberculosis. He gave no history of previous illness. He filed suit and was awarded compensation on the basis of aggravation of his disease caused by the inhalation of irritating fumes.

These cases are typical of a number of others which have recently come under our observation. They are important not only from a medical-legal standpoint, but because of their possible effect on rehabilitation programs for the tuberculous. Legally, the court decisions might be considered just. The unusual physical effort, in all probability, precipitated the hemorrhage. The fact remains, however, that tuberculosis was pre-existing in the individual, and the claimant was fortunate that the hemorrhage occurred while at work. It seems rather unfair to place the entire responsibility for such occurrences on the employers. The important point is the effect these cases will have on the future employment of persons with arrested tuberculosis.

Hundreds of such individuals are discharged each year from tuberculosis hospitals throughout the country. Many of them are quite capable of returning to gainful employment. Industry, however, is becoming more and more afraid to gamble on a former tuberculous patient because of the danger of becoming involved in a damage suit based on incidents more or less beyond its control. As a result, employers are making a more careful medical check of applicants and are refusing to employ those with pre-existing tuberculosis. Many firms at the present time require an x-ray of the chest before the applicant is passed for employment. This has its advantages and disadvantages. As a case-finding procedure, it will no doubt uncover a certain amount of tuberculosis which otherwise would have gone undiagnosed. It is, however, going to make it increasingly difficult for a large group of persons to obtain employment, until the problem of liability has been worked out in ways which will protect both the employer and the employee.

Conclusions

Hemoptysis is an important symptom of pulmonary disease.

Its significance must be considered serious until proved otherwise.

The majority of frank pulmonary hemorrhages are due to tuberculous infections.

In tuberculosis, bleeding may occur early or late in the disease and is no indication of the extent of the pathology or the degree of activity of the infection.

Hemorrhage from tuberculosis may occur in quiescent or even apparently arrested lesions.

Most pulmonary hemorrhages are self-limited and death from exsanguination is comparatively rare.

Severe hemorrhage may cause localized or massive atelectasis by forming clots in the air passages.

Tuberculous pneumonia or bronchiogenic spread of the disease from aspiration of infected material is a frequent and serious complication.

The medical-legal aspects of pulmonary hemorrhage alleged to have been aggravated by conditions of work raise a serious problem of employment for tuberculous patients.

ANNUAL HEALTH AWARDS TO CITIES

Among the Annual Health Awards to Cities for 1938, based on the effectiveness with which the community meets its health problems, and sponsored by the United States Chamber of Commerce together with the American Public Health Association, was special recognition for tuberculosis control. In this special contest, Hartford, Connecticut and Newton, Massachusetts tied for first place, with New Haven receiving an award of merit.

The first general health award for cities of over 50,000 population was won by Cleveland.

The Role of the General Practitioner in Tuberculosis Control

RALPH M. ALLEY, M.D.
Lapwai, Idaho

IN SPITE of a declining mortality rate during the past twenty years, the morbidity rate still remains high and the tuberculosis problem is, therefore, a very real one.

We have a large number of sanatoria and surgical departments in hospitals where miracles in the treatment of tuberculosis are accomplished—a large number of the cases being hospitalized, for the first time, with advanced lesions. The treatment of such cases requires specially trained physicians, whose services will always be a necessity, as a certain number of people never seek aid until forced to do so by the symptoms of advanced tuberculosis. A small number of cases will progress to the advanced stage in spite of good treatment. Advanced cases of tuberculosis are treated at a tremendous cost in lives, health and dollars. A great deal of this cost could be saved by an early diagnosis with a search for contact cases.

Whereas the management of the advanced case usually requires a physician with special training, expensive equipment, etc., the treatment of the patient with an initial lesion or a minimal lesion, in case of necessity, may often be successfully accomplished by the family physician. The treatment of early lesions usually gives a more satisfactory result, whether treated at home or in the sanatorium. I realize that a certain number of patients refuse to believe that tuberculosis is present when the diagnosis is made in the early stages, and that others will refuse treatment no matter how much involvement is present.

The diagnosis of tuberculosis does not depend upon complicated procedures requiring special training. The facilities are accessible to practically every physician. First of all, the physician must be willing to expend the same amount of patience and time required by any obscure illness. A careful history, a careful physical examination and sputum examinations are necessary. When dealing with children and young adults, the tuberculin test is invaluable. The x-ray is indispensable. The proper use of the above procedures would result, in a few years time, in a tremendous saving in the cost of treating advanced tuberculosis, and would aid greatly in wiping out one of the most devastating diseases ever known to mankind.

The physician in general practice is the one who is first consulted in the majority of cases. Upon his willingness or desire to search for the diagnosis, and upon his judgement, rests the proper diagnosis and treatment of the majority of people seeking medical advice. Therefore, in the hands of the general practitioner lies a very important link in the chain for tuberculosis control.

All who do tuberculosis work, specially those who have done routine tuberculosis surveys in public schools, frequently meet much opposition, not only from the laity, but also from the local physicians. The objections to the tuberculin test are many, ranging from the belief that a positive reaction indicates only those who have developed an immunity, to the extreme that a single test sensitizes the individual to tuberculosis and makes him more susceptible to future exposure to the disease. Many local physicians believe, and I think rightly so, that the testing should be done by themselves. But first, many of these physicians will have to acquaint themselves with the technique and value of the tuberculin test.

In this connection, I would like to relate an interesting occurrence which took place in this community several years ago. At that time we ran a tuberculosis survey of several hundred school children in this area for the State Anti-Tuberculosis Association. In one country high school that had a championship basket-ball team, the local physician accompanied us to see how the tuberculin tests were done and to determine, in his own mind, their value. The basket-ball squad consisted of ten husky six-footers. Of these ten boys, four were positive reactors, and the follow-up examination indicated that two of the four had active pulmonary tuberculosis, one having involve-

ment of an ankle joint in addition to the pulmonary lesion. Of these two, one died in a few months of tuberculous meningitis. The other has practically recovered after spending months in a sanatorium, but it was necessary to amputate a foot before the joint and bone involvement was controlled. This incident impressed the local physician to the extent that practically every patient that now enters his office is investigated for tuberculosis in addition to whatever else is indicated.

So, in order to obtain the full cooperation of the physician in general practice, he must first be made to see the importance of the tuberculosis problem and the value of a careful examination of all patients. The value of sputum examinations, tuberculin testing, and the x-ray must be made known to him.

This can best be done by stimulating the interest of the local medical societies to hold frequent tuberculosis programs, and in securing capable men to direct these programs. When the full cooperation of the general practitioner is obtained, we shall have made a big step in the control of tuberculosis.

Summary

Theoretically, tuberculosis is a preventable disease. Every case comes from another case. It may be impossible to discover and isolate all cases; but by a good educational program among physicians, many more cases will be discovered and isolated. All physicians must first believe in the program before we can expect the full cooperation of the general public.

An Ounce of Prevention is Worth a Pound of Cure

"Preclinical Medicine"

MALFORD W. THEWLIS

Williams & Wilkins Co., Baltimore, Md.
pp. 223 inc. Price $3.00

IT IS FAR better to prevent disease than to attempt to cure it. Each year sees us farther on our way in preventative medicine, but the road is still long and much work must be done before a longed-for Utopia can become a reality.

Life span has been markedly increased by the prevention of childhood diseases, but, on the other hand, more people reach old age and hence increase the incidence of degenerative diseases. Still much can be done in prolonging life when degenerative disease is found, and this in itself can be classified as a part of preventative medicine. At least medicine puts off, many times for years, the period of dissolution.

The average general practitioner is little interested in preventative medicine. His task is to attempt the cure of patients who present themselves with manifest disease. But more and more as the public becomes educated through the various agencies of prevention, the family doctor is confronted with the problem, and must acquaint himself with the fundamentals, at least, if he is to retain the respect of his families.

Books on general medicine give one but a brief knowledge of this type practice, and any volume dealing with this in a specific way should be welcome.

Dr. Thewlis in his book, *Preclinical Medicine*, has written a clear and concise outline which gives at a glance a working knowledge of this vast field. He shows that through a study of preclinical states and predisease, a synthetic diagnosis is obtained by means of which an analysis of disease tendencies are made; that the general practitioner is aided by his knowledge of the life history and actual condition of the patient; that close supervision of the patient must be maintained even in health; that the patient must be kept health conscious and not disease conscious; that disease evils and conditioning periods of disease are critical factors; that adaptation of present clinical methods and research to investigation of preclinical states and predisease periods is necessary;

that the importance of a protective program for children and adults is great.

The book is easy to read, has an excellent bibliography, is well printed and should offer the general practitioner a handy volume for reference after he has read it carefully and learned from its pages how to attack disease before it reaches the symptom stage.

L. S. Peters, M.D.,
Albuquerque, N. M.

Abstract

"Dawn of a New Day in the Treatment of Tuberculosis"

A. J. COHEN, M.D.*
Philadelphia, Pennsylvania

THIS brochure is one of the most interesting, beautifully prepared and illustrated that has come to the editorial desk of DISEASES OF THE CHEST in many a day.

Dr. Cohen in discussing the development of the modern treatment of tuberculosis covers briefly the whole story. Some of his outstanding observations are as follows: "Brehmer's was a simple treatment—fresh air, a diet rich in milk and dairy products, rest and regulated exercise.

"Time and broadening knowledge have changed many of the pillars on which this theory rested. For instance, diets are modernized; regulated exercise is completely abandoned, yet the theory of sanatorium treatment itself has grown more firmly established as each passing year has revealed its new accomplishments.

"Rest has been associated with the treatment of tuberculosis since the very beginning. It is on the matter of rest that modern treatment most drastically differs from early theories."

The most pertinent point that Dr. Cohen brings out is that the time limit of rest is gone. It used to be the rule that a prescribed period of six months was advocated. Later this was extended to nine months. Unfortunately this regimen is still carried out in a great many of our tax-supported institutions. I am sure that we will all agree with Dr. Cohen that there should be no time limit in the best sanatorium. He further points out that many sanatoria are still so constructed that practically only ambulatory cases can be handled. What is worse, the patients are made to do most of the work. They make their own beds, keep their quarters scrubbed and clean. Many work on the grounds, in the laundry, and help in the kitchen and dining room.

He says that the modern sanatorium should be so constructed that at least 60 per cent of its capacity is for bed patients, 25 per cent for semi-ambulatory cases, and 15 per cent for ambulatory cases. There should be absolutely no restriction as to the length of stay. Patients should be kept in bed until all evidence of activity is over, regardless of how long that may be.

Dr. Cohen discusses the new field in treatment; namely, surgery, and states that each sanatorium should be provided with a hospital building which should contain a well-equipped operating suite, a good x-ray layout and a first-class laboratory. The hospital should be so constructed and equipped as to make it suitable to do any surgery, and especially thoracic surgery.

He also states that a city dispensary is indispensable; that no sanatorium can fulfill its requirements without a city station.

We heartily recommend this brochure to every physician, and especially those connected in any way with a sanatorium.

C. M. HENDRICKS,
El Paso, Texas.

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* Clinical Professor of Medicine, Temple University.

Renal Tuberculosis

Diagnosis and Management*

A. H. PEACOCK, M.D.
Seattle, Washington

RENAL tuberculosis has always been one of the interesting problems of urology. So many types of pathology are encountered that each patient becomes a study in himself. We must take into consideration his economic status, duration of the disease, extent of the disease in extrarenal organs as the lungs and other viscera, the areas of the urinary tract infected, whether bilateral or unilateral, and what postoperative care is available.

The classifications of renal tuberculosis are many, as: (1) surgical and nonsurgical, (2) unilateral and bilateral, (3) destructive and nondestructive (La Comte), (4) miliary and caseous, (5) corticle abscess, (6) hydronephrosis, tuberculosis, (7) pyeonephrosis, suppurative, (8) closed tuberculosis, (9) calcified tuberculosis.

Diagnosis

In the early stages of renal tuberculosis the symptoms are almost nil. Tubercle bacilli have been found without the presence of pus or blood cells. Later these two cells are frequently found. Often there is no pain and no increased frequency. Guinea pig inoculations are valuable where direct smears have been negative. Ureteral specimens have been positive when the bladder specimen was negative (Thomas [1]).

The earliest subjective symptoms are urinary frequency with pyuria or hematuria in 95 per cent of the cases. Ultimately 40-50 per cent of renal tuberculosis become bilateral. A low grade afternoon temperature is significant. Loss in weight may not occur until late.

Cystoscopy is valuable. The ureteral orifice of the involved kidney is often reddened and swollen, while the ureter itself is frequently strictured (45 per cent). It is frequently impossible to pass a catheter in such a ureter. In these cases we resort to intravenous urography. Normally we collect the urine per ureteral catheter and make a retrograde pyelogram. This will show the typical sausage-shaped ureter and erosions or cavities in the kidney parenchyma. Thomas, in a series of sanitarium patients, demonstrated that some early, minute lesions of the kidney may heal spontaneously. I recall a bilateral infection in a medical student who had hundreds of tubercle bacilli in every specimen. He has survived ten years and has a negative urine.

As ulcers develop in the bladder, frequency and dysuria increase. The capacity of the bladder is diminished and the patient's distress is great. Non-urinary tuberculosis lesions are found in 53 per cent according to Kretschmer [2]; 16.27 per cent in the bone or joints and 37.2 per cent in the lungs. Direct smears of the urine were positive in 88.3 per cent, smears and pig cultures were positive in 93 per cent. Thomas [3] states that tubercle bacilli were found in the bladder urine in 77 per cent, and 93 per cent in ureteral specimens. Roentgenograms are a great help. Control roentgenograms revealed shadows of calcification in 25 per cent of the cases. They are often multiple.

In making a diagnosis, renal catheterization is almost indispensable. According to Henline [4], Meyer [5] and Thomas it is an examination without danger of infecting the good kidney in unilateral disease. The presence of a clean normal ureteral opening on one side and an ulcerated, edematous one on the other side is most suggestive of a descending tuberculosis. Often a dye is necessary to locate the diseased ureter. In cases of stricture of the ureter, a supplemental intravenous urography will demonstrate cavities of the pelvis, dilations of the ureter or a nonfunctioning kidney. Gile [6], in reporting 96 nephrectomies for tuberculosis, states that the diagnosis was made in 86 cases by cystoscopy and the pyelograms were positive 73 times. The tubercle bacillus was found in 68 cases out of 70 cases studied. They no longer resort to guinea pigs.

In a study of my own cases I find that the

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* Read before a Meeting of King County Medical Association, Seattle, Wash., Oct. 18, 1937. Reprinted from *Northwest Medicine*, Vol. 37, No. 2, February, 1938.

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cases most often overlooked are those patients who have had a mild bladder irritation or frequency for months. They invariably had a pyuria with an absence of bacteria on the methylene blue or gram stain. These patients usually give a history of futile treatment by oral medication and bladder irrigation.

Once we are sure of the presence of tuberculosis in the renal tract, we must make certain as possible whether it is unilateral or bilateral and whether coexisting extrarenal tuberculosis is present.

Treatment

First, should be mentioned the nonsurgical conditions. Obviously renal tuberculosis is a secondary and not a primary invasion. The original focus may be minute or even healed. The greatest number of these are found in the lungs. They may be temporarily quiescent, ready to flare up at any time. It is well to keep in mind that tuberculosis is a general infection, and that in 80 to 90 per cent of renal tuberculosis cases, the infection in the beginning is unilateral. This stimulated the dictum of Albarran and Israel that early diagnosis and nephrectomy will arrest many cases. Eventually the tuberculous lesions increase in size and spread to other organs by the hematogenous or lymphatic routes.

There is some difference of opinion as to the treatment of bilateral renal tuberculosis. Take the problem of an extensive lesion within one kidney with low function and a small limited area of disease in the opposite kidney. Some will advise nephrectomy in the worse side. Unless the disease in the second kidney is minute, I believe nephrectomy in such a patient is quite useless. Once started in an organ, tuberculosis has a great tendency to spread and increase its area of destruction.

We well know that the treatment of pulmonary tuberculosis has made great progress and that the best results have been obtained, when the patient is put to bed early, before massive involvement has occurred. The well advanced cases offer little opportunity for arrestment. These lesions must be picked up early. This applies equally well to renal tuberculosis.

Heminephrectomy, or resection of that portion of kidney involved with tuberculosis, has been recommended or suggested. There are no records, however, of cases treated in this manner. The ease with which these wounds break down, when any of the tuberculous material is spread, does not suggest it as a good surgical procedure.

Taking a lesson from the brilliant work of the phthisiologists, we have seen the practical value of long periods in the decubitus position, perfect rest and supporting or stimulating the natural repair processes of the body. Plenty of healthy blood has few substitutes as a healing agent. A well balanced diet, controlled sunlight, massage and passive exercise, with abundant fresh air will help produce such blood.

Such medical care should be established routinely in renal tuberculosis. This has not been brought to the patient's attention as it should be. There is such faith in the curative value of operations that most patients believe themselves well after the incision has healed. A long period of convalescence is absolutely essential. It is quite impossible without the aid of a postmortem to tell the exact extent of a tuberculosis, especially, the early lesions, which are too small to give either subjective or objective symptoms.

Another nonsurgical tuberculous lesion, where surgery is questionable, is the so-called autonephrectomy or closed tuberculosis. In this condition we usually find normal urine from the healthy or uninvolved kidney. The ureter of the diseased side has undergone inflammation, ulceration perhaps, and a complete blockage through stricture. In the meantime fibrous tissue, fat replacement and calcification have taken the place of normal renal tissue. The change is often carried to the point of complete atrophy or replacement of the glomeruli and renal tubules.

Roentgenograms may show extensive calcification. In the presence of clear urine, lack of pain, afebrile temperature, normal weight and a patient past middle age, surgery is not indicated. Not only would there be the risk of a formidable operation, but an opportunity to stir up an encapsulated, well closed off tuberculous process. Such a procedure could well be classified as meddlesome surgery.

There are several things to be especially borne in mind in nephrectomy for tuberculosis. The function of the remaining kidney

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should be clearly known. Intravenous fluids should be given the day before operation to secure a free flow through the good kidney. Not infrequently we encounter a partial or complete anuria following operation, even in a kidney which gave a normal function before operation.

Great care should be made to clamp the renal blood vessels early, to prevent an invasion of other organs through the blood stream. The kidney should not be torn nor the pelvis punctured, thus contaminating the operative field with tuberculous urine. This would result in weeks of delayed healing and suppuration. If an aseptic operation is performed, the wound will heal by primary union. Even drains may be dispensed with, though a cigaret drain for twenty-four hours may be safer.

A word about the ureter. This tube is often the site of an active interstitial tuberculosis, the walls greatly thickened, edematous and the lumen containing tuberculous pus. As much of the ureter as possible should be removed. The double incision for ureteronephrectomy is the ideal one. First the ureter is picked up extraperitoneally through a low midline incision. After ligating, cutting and capping the ureter, the wound is closed and the patient turned over for the classic loin incision for nephrectomy. In this manner the entire ureter is removed as a possible focus for continued infection of the bladder. Reflux in a tuberculous ureter is commonly seen.

Summary

1. When a renal tuberculosis has been established, find all the extrarenal tuberculous processes. We deal not with a local disease but a generalized one.

2. If a pyuria exists, without demonstrable bacteria, search for bacillus tuberculosis until you find it. Good staining and a patient microscopist are successful in 90 per cent of the cases.

3. Remember that 40 to 50 per cent of renal tuberculosis is bilateral.

4. Surgery alone is seldom curative. Months of postoperative rest, good food and sunlight are necessary in most cases.

5. In unilateral renal tuberculosis early surgery is indicated and gives the best results.

6. A careful surgical technic to avoid contamination with tuberculous pus will greatly shorten postsurgical healing.

7. The decubitus position for months after the operation is invaluable.

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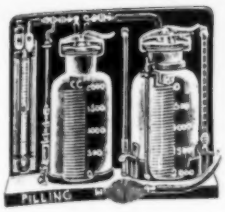

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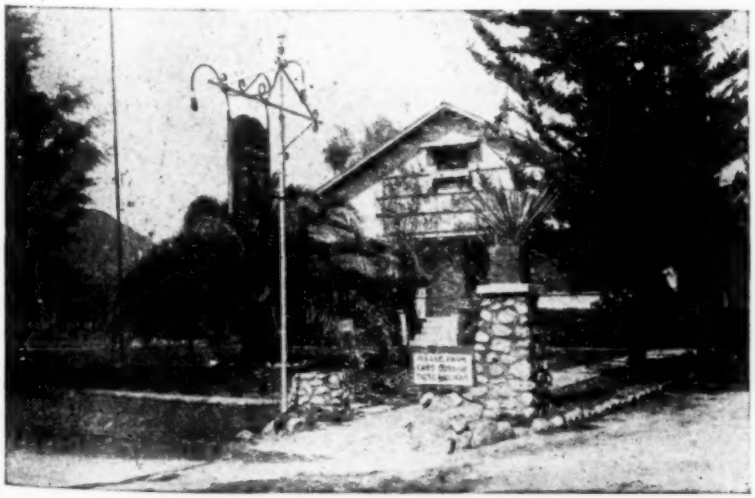

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Thursday, June 15th, marked the twentieth anniversary of Dr. Louis Mark's coming to Rocky Glen Sanatorium and his development of the institution into what is now the largest private sanatorium in the world. In a setting marked by luxuriant pink and red rambler roses over an inviting pergola, Rocky Glen Sanatorium welcomed some three hundred and fifty guests to the twelfth annual spring meeting of the Eighth District Medical Society.

At twelve o'clock noon all were seated. A warm welcome was extended in "the same old words in the same old way" by Superintendent Harry A. Phillips, who gave assurance of the pleasure felt in entertaining such friends and extended a cordial invitation for all to return again next year.

A delicious dinner was served, following which Dr. George Gressle of Newark, president of the Eighth District Society presided at a short business meeting and elected officers for the year: Dr. Carl Brown, Lancaster, President, and Dr. Leo Stenger, Lancaster, Secretary. Dr. Gressle then turned the meeting over to Dr. Donald G. Ralston who introduced several prominent guests who spoke a few words of greeting and who expressed their great pleasure and congratulations to Dr. Mark.

Then, surprising Dr. Mark completely, Mr. Phillips told briefly of Dr. Mark's development of the Sanatorium, comparing him to the Captain of a ship, who with courage and foresight met every obstacle which confronted him either financially or otherwise and continuing by sailing it through rough shoals of tuberculous disease to the clear coast of the port of improvement, arrestment and recovery; and at temporary anchor was providing his friends with rest and recreation as they surveyed his achievement. Mr. Phillips spoke further of Dr. Mark's friends knowing him as one of the highest ranking officers of his profession, and a commanding leader. At this point, and as a token of their esteem, in behalf of the Staff and employees of the Rocky Glen Sanatorium, Mr. Phillips presented to Dr. Mark a silver plaque in the shape of a shield, engraved with a picture of the Administration Building, his name, words in memory of the occasion, and the date.

TWIN ADDRESSES

Dr. Frank Walton Burge, of Philadelphia, Pennsylvania, delivered an address on *The Pennsylvania Plan for Tuberculosis Control and New Trends in the Treatment of Pulmonary Tuberculosis* before the annual afternoon meeting of the Lycoming County Medical Society on June 9th, 1939, at Williamsport, Pennsylvania. And in the evening of the same day, Dr. Burge delivered an address on the *A B C's of the Pennsylvania Plan for Tuberculosis Eradication* before the annual meeting of the Lycoming County Tuberculosis Society at Williamsport, Pennsylvania.

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